Geographic Information Systems and Energy Planning Support Tools

UNEP - Solar and Wind Energy Resource Assessment Project

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Overview

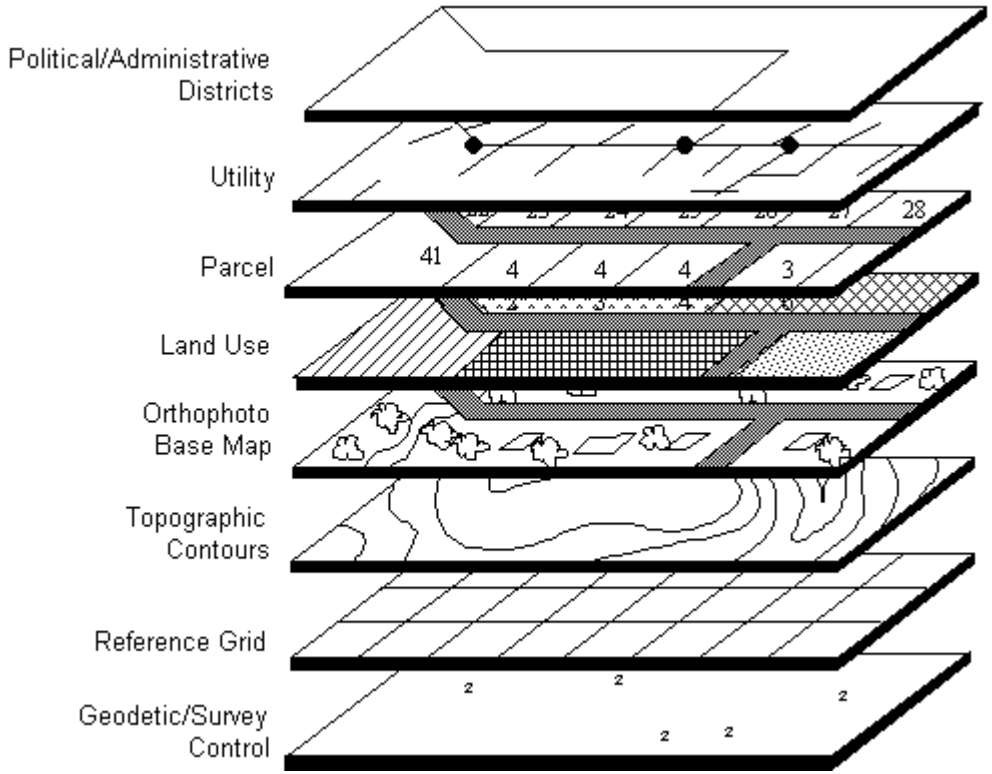
- What is a Geographic Information System (GIS)?
- GIS in Resource Assessment
- GIS within the Solar and Wind Energy Resource Assessment Project

What is GIS?

- A Geographic Information System is composed of:
  - hardware
  - software
  - data
  - people
  - methods

What is GIS?

- All information in GIS is linked to spatial reference used to store and access data
  - Where is it
  - What is it
  - What are it's characteristics



Key Functions

- GIS data layers can be recombined or manipulated and analyzed with other layers of information
- Identification of relationships between features, within common layer or across layers
- Query or manipulate data based on the tabular and/or the spatial characteristics

Why use GIS?

- Integrate diverse data sets into one system
- Examine, manipulate and analyze different types of information simultaneously
- Provide a common platform for distribution and technology transfer
- Supports decision making

GIS in Resource Assessment

- GIS is integral in models for resource assessment activities at NREL
  - Large data sets with differing resolutions
  - Common platform required for modeling
  - Common platform for mapping model output

GIS in Resource Assessment

- Solar - GIS provides the environment and interfaces with external model - Climatological Solar Radiation model
  - Preprocessing climate data
  - Preparing data for input to model
  - Model management
  - Visualization and comparison
  - Mapping model results

GIS in Resource Assessment

- Wind - Model is internalized within the GIS
  - Terrain data
  - Meteorological data
  - Terrain-based modeling technique incorporates both types of data
  - Mapping model results

GIS in the SWERA Project

- Dual platform support
  - Standard GIS databases
  - Energy Planning Support Tools (user platform)
- Integrate wind and solar resource data
- Framework for deployment planning
- Mechanism to distribute resource assessment information and data

Dual Platform

- Standard GIS databases for users of existing GIS systems
  - Database compilation, conversion, editing
  - Tremendous range of functionality
  - Scientific capabilities must be developed and programmed for specific applications
  - High associated costs from:
    - Software and hardware
    - Staffing requirements

Dual Platform

- Energy Planning Support Tools
  - Less specialized, broader user access
  - Highest priority functionality
  - Pre-defined capabilities will be programmed for distribution with software
  - Lower associated costs due to:
    - Software and hardware
    - Staffing requirements

Dual Platform - Reasons

- Clearly defined objective may be better met with easy-to-use, limited set of tools
- Satisfy needs of wide range of users
- Existing GIS capabilities are less critical to success of project dissemination
- Tools are useful only when used

Resource Assessment Atlases

- Atlases will be integrated within common GIS platform
- GIS platform will support inclusion of future resource assessments
  - biomass
  - geothermal
  - microhydro
- GIS platform will support analysis of multiple renewables for a given geographic area

GIS Provides Framework for Deployment Planning

- Resource assessment data combined with other data for project…
  - identification
  - planning
  - implementation
- Guide investment activity
- Future enhancements to support further business activity

GIS is a Vehicle for Technology Transfer

- Provide end user with more information to support better project planning
- Energy planning support tools will help ensure successful deployments
- Energy planning support tools will facilitate public/private sector partnerships through a common base of knowledge

Distribution Mechanism

- Common format for data and tools
  - Resource assessment data and associated information, not just maps
  - Accompanying data such as population areas and land use
  - Analytic tools
  - User platform support

Distribution Mechanism

- Subsequent support, updates, and other activities will follow these formats
- Variety of distribution options are available:
  - CD-ROM
  - WWW and Internet Map Server
  - Hardcopy Atlas

Summary

- SWERA increases awareness of the value of clean technology options
- GIS places solar and wind mapping into an overall project development context
- Dual platform approach makes critical information accessible to a broad segment of project planners, developers, and financiers